

JUN 18, 1928



# SCIENCE NEWS-LETTER

*The Weekly Summary of Current Science*

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June 16, 1928



## AIRPORT AT NIGHT

*Soon a Familiar Sight*

(See page 370)

Vol. XIII

No. 375

# Chemical Links Told By Dark Bands

Chemistry

The chemical bonds between particular kinds of atoms are tuned precisely with certain wave-lengths of light, according to recent discoveries of Dr. Joseph W. Ellis, physicist in the University of California at Los Angeles. Instead of cooperating with the light radiation, however, these chemical attachments nullify or absorb the special light waves to which they are attuned. Dr. Ellis thus identifies the bonds by noting the kind of light which does not get through the substance he is investigating.

For decades chemists have been able to tell what elements are present in a substance, and in most cases how many atoms of each. The pattern by which the atoms are tied together in compounds, however, is known or guessed only on circumstantial evidence. Nevertheless the pattern is all-important. Dr. Ellis' experiments show which atoms are directly bonded together.

Chemists would gladly accomplish

all this by magnification and direct photography of the molecular structure. Unfortunately this is impossible with atoms only one two-hundred-millionth of an inch in diameter, and light waves five thousand times as wide.

By the new methods infra-red, or low frequency, rays are passed through simple chemical compounds like aniline, alcohol, etc., whose structure is already known and undisputed. Accurate measurement is made at the odd places in the spectrum where a stoppage of light is caused by particular chemical bonds. Dr. Ellis is able to specify with high numerical accuracy just what wave-length, or color of light will be absorbed if a substance under examination contains, for example, a nitrogen atom attached to a hydrogen atom. Nitrogen and hydrogen atoms scattered about in other relations and tied to other atoms give no such response. Similar data have been obtained for the carbon-

hydrogen and sulfur-hydrogen bonds. Many additions to the list are expected with further research.

By combining a spectograph and camera with electrical accessories, the physicist simply tests his substance down the gamut of the spectrum from blue to infra-red. Each chemical bond records its presence by a dent in the photographic line record. Just as a piano wire may respond to sounds in more than one octave, so the chemical bonds give over-tone records which confirm the proof desired.

Even greater value may lie in the possibility of calculating the strength of a chemical bond. Dr. Ellis is enabled through mathematical physics to show how firmly a substance is bonded on a basis of the wave-length chosen. From such a computation it may be possible to predict in some degree the possibility of some desirable chemical reaction taking place.

Science News-Letter, June 16, 1928

## An Airport at Night

Aviation

In a few years such scenes as that on our cover this week will doubtless be familiar to travelers. Already in Europe there are many passenger planes leaving from the great airports, like Le Bourget and Tempelhof, at night. And in America the air mail has pioneered in nocturnal flying for extended periods of time.

The cover illustration is from a painting by Walter L. Green, made for the General Electric Company, through whose courtesy it is reproduced. It shows an airport illuminated according to the most modern practices. The revolving beacon light, extending out to the horizon, the flood-lighting of the field itself, the boundary marking lights, and the wing lights on a plane about to land—all these are shown by Mr. Green.

Science News-Letter, June 16, 1928

The Emperor Nero is said to have destroyed a number of his enemies by feeding them poisonous mushrooms at a banquet.

A lake in Glacier National Park is so surrounded by towering cliffs that the sun shines on it only a short time in the year, and icebergs float on the water all the year round.

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**I** NTERPRETING week by week, the latest developments in the various fields of science, this magazine attempts also to present its articles in the most pleasing and readable topography and the most convenient arrangement.

The *clippability*, *indexing*, and *automatic dating* of each article are unique features.

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Each article is automatically *dated* by its last line.

All of the resources of Science Service, with its staff of scientific writers and correspondents in centers of research throughout the world, are utilized in the editing of this magazine.

# Psychologists Look for Honest Children

Psychology

By EMILY C. DAVIS

Diogenes, looking for an honest man, has come back to earth.

The modern Diogenes is a scientist. In place of the old Greek philosopher's lantern, with which he peered into doorways seeking to reveal a truly upright Greek, the modern scientist depends on carefully prepared tests of character. The modern quest for honesty is being carried on, not by roaming the highways and byways of America, but by measuring with a scientific yardstick the characters of America's growing generation of citizens.

Character is perhaps one of the most elusive things that science has ever tried to apply a measuring stick to. But the modern psychologist believes that he can succeed. Does living in a "better home" make Johnny a better boy? The psychologist sets about the task of measuring the effect of the home on character. Do sermons make people deal fairly with their fellows? There is something else to be measured. Are some folks born good and some bad? They can be measured to find out whether they are getting better or worse.

Under a grant furnished by the Institute of Social and Religious Research, investigators at Teachers' College, Columbia University, are carrying on just this type of research into the nature of character. The research is called the Character Education Inquiry. The investigators are Dr. Hugh Hartshorne, of Teachers' College, and Dr. Mark A. May, of Yale.

During the past four years 12,000 children have been measured to find out where and why deception occurs and to aid the scientists in developing a scientific test of character. The results of the character inquiry are to be published in a series of volumes, the first of which, on deception, has just appeared.

What is it all for? Well, for one thing honesty is important in this world where men have to trust one another. Old Diogenes, who lived in a tub, showed a keen sense of values when he dedicated his spare time to a quest for an honest man, a man of straight dealing and clear thinking. The old philosopher wanted to show the Greeks what a fine rare figure a thoroughly honest man is. When you consider the amount of bribery, petty graft, and double crossing in

business, the political scandals and social intrigues, with which everyday life is honeycombed today, just as in ancient Athens and Corinth, it becomes rather obvious that home-made, haphazard methods of teaching honesty to children will always bear an alarming quantity of weird fruit.

For another thing, it is pointed out that schools and churches are now having to deal on an enormous scale with children's character problems that were once handled by fathers and mothers at home. And where the head of a family could experiment with methods of instilling honesty in his three or four children without endangering the nation, there is an awe inspiring responsibility and real danger in trying out unscientific and possibly harmful programs of moral training on the children of a whole city.

So, science has stepped in, believing that the children who do not get along with others, who are sneaky, and selfish, and undependable, can only be set on the right track to successful living through scientific understanding of how and why they get that way.

No one is honest or dishonest by nature, it has been shown. Honest and dishonest acts arise out of specific situations. Most children will cheat in certain situations and not in others. A boy who regularly cheats at arithmetic may never think of cheating in spelling lessons. Deception is the result of a conflict between the individual and his environment. It is an age-old method of getting results in time of trouble.

Three-year-old Jimmy, who wants a piece of forbidden chocolate, says: "Daddy, don't look." While Daddy plays the game, with his fingers over his eyes, Jimmy gets the candy, and then completes the deception by looking innocent with exactly the same expression of unconcern as the cat that has gobbled up the goldfish.

If young Jimmy's strategy is successful in meeting situations where he is thwarted, he tries this underground method of getting his own way again, and again. If deception is frowned upon at home, he becomes wary of using it where there is real danger of being caught. But if the boys on the block and the boys at school approve of cheating and lying, as they do in many a classroom where honesty is bad form, then the child contracts the fixed habit of using deception in

certain situations as a matter of course.

In making one test of deception the examiner stands before a class room full of children.

"Here is a sheet of paper with ten circles on it," he says. "I want you to shut your eyes and try to make a pencil dot in the center of each circle."

The children poise their pencils, squeeze their eyes tight shut.

But they find that getting dots into circles with eyes shut is hard. It is even harder than pinning the tail on the donkey at parties. The psychologist is not looking. Will the children peep? A very large proportion will. And so will a very large proportion of adults, for that matter, if faced by this particular problem of putting dots into circles and left casually to their own standards of honesty.

To the psychologist who looks over the papers afterward, their cheating is clearly revealed by the accuracy with which the marks are placed in the circle.

In another experiment of honesty the children were given a set of questions to answer and then were allowed to score their own papers by using an answer sheet. Another day a similar test was given, but this time the children had no chance to improve their records by use of an answer sheet. The difference between what the child could do without the answer key and what he did when cheating was possible indicated the amount of cheating that took place.

More than twenty such tests of honest conduct have been used in testing school children in a number of cities in the past four years.

Deception runs in families, in about the same way as intelligence runs in families, the investigations reveal. It has not been proved that deception is inherited, the psychologists hasten to explain. But temperamental make-up and the home conditions of the family are likely to work together to produce a family level of honesty. Parents who lie to the servants set an example of deceit that the children copy expertly. Parents who are over-severe, and parents who smugly believe that their children never lie or deceive in any circumstances provide a home setting where the children soon learn that deception produces the most satisfactory results without any fuss.

(Turn to next page)

## Modern Diogenes—Continued

Children in poverty-stricken homes and children in broken families are more likely to be driven to dishonest practices than children in comfortable well-organized households. In poor homes there is a constant struggle for existence, and it is more difficult for the children to stick to honest dealing when they can see that cheating, lying, and stealing would help them out of many a hard place. In better homes, ideals of honesty are more likely to be absorbed easily along with good manners and a liking for good books, music, and pictures. Though, obviously, there are many exceptions in both rich and poor homes.

A surprising connection between the occupation of a father and the honesty of his children has been found. Children of unskilled laborers cheated more than was to be expected from children of their intelligence. Children of business men and artisans and children of professional men cheated less than would be expected, the professional man's children standing out prominently as the least deceptive group of all. Bootlegger's children were found to have a noticeably low level in honesty.

"It is not surprising that children of one level of occupation are somewhat alike in their behavior," say the authors. "There are the traditions, codes, social contacts, standards of dress and success which are the direct consequence of being the son of a plumber rather than the son of a street cleaner, the child of a college professor rather than of a truck driver. The occupation of the father colors the life of the child, creating his tastes and attitudes, not only by what his father says about his work, but what the father's friends of the same occupation say about it, what the neighbors say about it, what the teacher, storekeeper, bank teller, newspapers and motion pictures say about it.

"In a similar way cultural influences associated with nationality, race, and religion operate directly upon the child. The old codes and attitudes are kept alive by the church, newspapers, books, and neighborly gossip.

"In one population of varied nationalities, out of all the tests the Americans cheated on the average once in every three opportunities, Jewish children once in every four, and other nationalities once in three. But in a test which the children worked on at home, the same Jewish children cheated more than the Americans, and other races cheated less."

Important as home and family are in shaping a child's attitude toward fair play, the school is still more of an influence. Deception spreads through certain gangs of children and through certain schools like a contagious disease of character. In some classes not one child in the room cheated on certain of the conduct tests. In other classes every child seized the opportunity to cheat on the same tests.

In one of the tests given by the psychologists each child was shown a sheet of paper covered with rows of letters and told to underline as many A's as possible before time was called. The children took this test twice, and were told that these were practice tests of their speed. Then they took the "real test of speed" using a third sheet of letters. This time they scored their own speed, counting how many of the A's they had marked in the given time. With no one watching, it was a simple matter to mark a few more A's while checking up on the score. But the psychologist was not fooled. As a matter of fact, an individual does about as well on the first trial at this sort of work as he would do on the third or tenth trial. A child whose self-scored paper showed 14 more A's underlined than his practice sheets showed, has certainly been juggling his score.

In one junior high school class of 31 pupils, there were exactly 31 pupils who cheated on this test. In a third grade, too, every child cheated. In a private school for boys cheating on this same speed test ranged from no cheating whatever in the fourth and fifth grades to 47 per cent. in the ninth grade and 39 per cent. in the tenth-grade class.

What pupils learn about deception in one classroom, they are apt to carry along with them into the next grade, the investigators found. The same group of children given honesty tests from one year to the next is likely to keep to its own distinctive level of honesty, or lack of it.

The individual teacher does not play so large a part as might be expected in altering the tendencies of the children who spend a year in her room, not so large a part at any rate as the children play in shaping the characters of one another. Still, it is found that a teacher whose room has a friendly atmosphere of cooperation may noticeably raise the level of honesty among the children, judging by the higher degree of honesty shown

by children in certain school rooms from year to year.

One striking fact shown by the tests is that children most frequently take to cheating in order to make good marks. The pressure of getting good grades at almost any cost is a powerful motive among children of the grammar grades and high schools. In one part of the investigation, children were asked whether they cheated on certain tests, and if so, why. Two-thirds of the children who admitted cheating said that they did it in order to make a good grade on the work.

The experimenters say that they did not study young children to find out whether cheating begins in kindergarten, where no marks are given. Further investigation will be necessary to discover just when a pupil first resorts to subterfuge to keep up with the parade—or ahead of it, according to his ambition.

"Judging from what little work on deception we have done in the third grade," the psychologists' report, "there is a process of experimentation going on there, similar to that of the still younger child at home. Teacher and pupil are, so to speak, maneuvering for position and trying one another out. Practices which later come to be clearly defined as deceptive are appearing, partly because of misunderstanding of the teacher's directions and partly in a kind of struggle for existence.

"It is possible that these acts, which seem to adults to be unfair, are not at first regarded in that light by the pupils, but are rather taken for granted without moral reflection. There are some children, of course, who never cheat, either because it does not occur to them to do so, or because the acts involved are distasteful to them for some reason. By the time a child reaches grade five the practice seems to be fairly established and does not change materially through grade twelve."

Outside of school room and home the young citizen who is building up his character experiences comes into contact with still other people and other situations that he must meet honestly or crookedly. If his best friends lie to each other or cheat at games, he soon adopts their standard. This was shown by asking children to state who their best friends were. When the ratings of friends on the honesty tests were compared, a striking resemblance in cheating, or lack of it, was shown. (Turn to page 381)

# Exhibit Shows Chinese Purgatories

*Ethnology*



ONE OF THE TEN COURTS OF THE CHINESE PURGATORY, as depicted in an exhibit at the Field Museum of Natural History in Chicago, showing how they are represented in a Chinese morality drama. Each court has its own list of tortures meted out as punishment for the sins under its jurisdiction. The various deities and devils are shown sitting as judges. In the left foreground are seen the legs of a mortal who is being ground between two stones, on the right another being pounded, though the lily sprouting from his breast indicates his innocence. (Photo by courtesy Field Museum.)

In the belief of the Taoists of China there are ten purgatories through which the shades of the dead pass. Eight of these have sixteen wards each, and a separate torment is inflicted in each ward. Many of these surpass anything conceived in Dante's "Inferno." However, a certain grotesquely humorous flavor is lent to the Chinese purgatories as depicted in the morality drama, the Ten Courts of Purgatory, popular on the stage in China. For example, many of the puppets representing souls undergoing the most horrible tortures have blandly smiling faces. A reproduction of scenes in the ten purgatories drama forms an interesting exhibit at the Field Museum of Natural History, in Chicago.

In the first court, the Chinese believe, every man and woman must ap-

pear after death, and if their tale of good and evil works is equally balanced they are returned to life, according to Dr. Berthold Laufer, curator of anthropology at the museum and noted Orientalist.

While the great sins are essentially the same as those usually recognized as such by western civilization, the Chinese include also among the crimes for which terrible punishments are meted out after death, such things as falsely stating one's age to marry for gain; repudiation of a betrothal; slighting of husbands by wives; finding fault continually with the weather; promotion of litigation; tax dodging, and getting deeply into debt. The drama warns against race suicide by depicting a hungry shade—a man who died without issue, and consequently has nobody to feed him after death

with the prescribed ancestral sacrifices. He is a vagabond in the other world, begging alms of other souls.

Here are a few of the many forms of torture to which culprits are supposed to be subjected in the various purgatories: they are ground in a mill composed of two large stones; they are stretched on a rack; they are roasted by being tied to a fiery pillar; they are forced to climb a hill bristling with knives; their hearts are scratched and squeezed with pincers; their feet are chopped off; their sinews are cut and their bones pulled out; they are choked with fire; they are rolled and flattened on ice; they are boiled in oil, stewed, and wrung out like clothes. In the end all the shades are reborn on earth either as animals or people.

*Science News-Letter, June 18, 1928*

## Overhead—But “Underground”

### MALTHUS WAS RIGHT.

The fight for room and sustenance becomes ever more bitter. It has driven a lot of little fellows to strange shifts.

They are among the world's keenest competitors for food. Four families of them make up the bulk of the animal population on the globe. In one stage of the life cycle they have chosen the interior of leaves where there is protecting and abundant food—and where quarters are almost as crowded as in a Park Avenue apartment.

Here their operations rival those of the men who dig in the earth for coal and other precious stone. They tunnel winding galleries, or excavate broad chambers between the upper and nether “skin” of the leaf. Some of them find room to stow waste away in a corner and spin a screen of white silk to cover it.

They are the leaf-mining insects—really the larvae of moths and beetles and flies. And leaf-miners are everywhere; in every lane and fence-row one may find their signatures. They take the first table at the Green Leaf Banquet—for green leaves are the world's dependence for food supply.

The story of these highly important (economically and ecologically) and interesting little chaps is told most entertainingly in

### LEAF MINING INSECTS

By JAMES G. NEEDHAM of Cornell University, STUART W. FROST and BEATRICE H. TOTHILL.

The aim has been to offer an untechnical introduction to the study of leaf-miners for the student and general reader; to give an account of their natural history sufficiently detailed to be useful to the working ecologist, professional or amateur; and to provide lists of leaf-miners, their host-plants and technical papers concerning them, adequate for the specialist.

A brand new book. Indispensable to the school library. Just the thing for nature lovers who like to delve beneath the obvious.

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### SPEAKING OF FOOD:

Human beings also eat, and on what they eat depends health and oft-times wealth and happiness.

The chemist in his laboratory has taught us much about our food supply during the last quarter century—that all is not food that is chewable. We have learned to talk glibly about nutrients and calories and the curious food factors to which the name *vitamin* has been given.

Naturally the new information, coupled frequently with partial knowledge of it, has produced its appropriate share of food faddism and indiscreet claims. We are still far from knowing all about food factors, though we do know a great deal more than we did. In

### NUTRITION

By WALTER H. EDDY, there is set forth a conservative statement of the things we know and why we know them, in language for the general reader—a summary of the results of these years of research and investigation, pleasingly presented by one who ranks high among the nutrition experts of the world. Dr. Eddy is Professor of Physiological Chemistry at Teachers College, Columbia, and Associate Director of the Bureau of Foods and Sanitation of “Good Housekeeping” magazine. He is the author of the popular *Vitamin Manual*.

The new book is in two parts, one dealing with general food requirements, the other with vitamin requirements. It tells what must go into a diet to make it complete; how these factors are measured; what calories are; how much protein, and how much fat and starch we should eat and why; why we require certain inorganic nutrients, minerals like iodine and calcium and iron.

In Part II we learn what vitamins are, and something of the history of their discovery; what we know of the different kinds; how food is tested for vitamin content, how cooking affects the vitamins; how vitamins function in the body; how to select them.

Clothbound. 225 pages. Index.

The price is \$2.50

## Domesticity in the Zoo

*Zoology*  
TH. KNOTTNERUS-MEYER, in *Birds and Beasts of the Roman Zoo* (Century):

A true original was Mascalzone (Scamp), an old hamadryas baboon, one of whose eyes had been put out by a brutal sailor; but he was still able to grumble and scold about everything he saw, just as well as any two-eyed baboon; for a true baboon is always cross about everything. Mascalzone had already a history; he had been employed at a bacteriological station in Eritrea, and there, as an old acquaintance of his informed me, he used, when given an injection, to acknowledge it by a military salute. He did not really deserve his name. Although choleric, he was a good fellow, never treacherous, and would offer his hand and rejoice whenever one went to see him.

With the monkeys in the next cage, whom he could see through the intervening bars, Mascalzone lived in a state of continual warfare. One could hear his cries almost all day long. The hay and sand would fly about the cage, and now and again his worldly-wise wife would bear the brunt of his anger. At such times Teresa would bow her head and sham dead until the storm was over. But he never really hurt her. At meal-times he would sometimes seize her by the neck with one hand and with the other would open her mouth and look into it, but he never took anything from her. Teresa, though meekly complaining, would accommodate herself to his humor.

Teresa too had a varied past behind her; she had once been a circus performer. She had first and last many successive husbands; and in course of time developed a regular system of handling strong though not silent men; her last two husbands she completely mastered.

Mascalzone's death was tragic. During a violent thunderstorm a very loud thunderclap frightened the warlike Mascalzone so that he fell dead from the top of the cage. Healthy and lively as he was, he had died of fright.

*Science News-Letter, June 10, 1928*

The most completely preserved of the medieval crusaders' castles in Syria is to be studied by a scientific mission.

A recent electrical exhibit is a lawn mower which operates from house current and uses about the same amount of electricity as an electric iron.

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# Mental Condition Foreshadows Crime

Psychiatry

Following are reported some of the interesting papers presented at the Minneapolis meeting of the American Psychiatric Association.

How the horrible Hickman murder might have been prevented, how a penniless negro was saved from the consequences of an apparently unjust conviction for murder and how psychiatry might have speeded true justice in three other widely heralded murder trials of the past winter is told in a committee report. The report declared:

"Had Hickman been examined after his earlier crimes, had he been given an examination when he was arrested for forgery, he would almost certainly have been found to be possessed of psychopathological indications to an extent indicating confinement and observation. In this way the spectacular murder, which made him infamous, would have been prevented."

Of importance to every parent whose own child may be the victim of such future crimes is the following statement by the committee:

"It is a curious paradox that psychiatrists who are desirous of preventing crime by examining the personality make-up of offenders, are not called at the time when the premonitory symptoms of social maladjustment are exhibited but only after the extreme, violent, irretrievable explosions have occurred. Your committee feels that it might be helpful in making clear the attitude of psychiatrists if we pointed out that it is our wish and proposal that we be called not merely when the major crimes have been committed, but when minor crimes have been committed, in order that major crimes may be anticipated and provisions made to prevent their occurrence."

The introduction of the question of insanity at the Hickman trial by the defense lawyers was termed by the committee report an "unfortunate and regrettable fiasco," which "retarded the cause of psychiatry in the courts."

What appears to be an extraordinary miscarriage of justice was cited by the committee as evidence of the necessity of submitting witnesses as well as accused to mental examination.

George Watters, an obscure and penniless negro of Sacramento, Calif., was convicted of murdering his wife and sentenced to be hanged, chiefly upon the testimony of his nine-year-old daughter. Only a few hours before the time for the execution, the

governor commuted his sentence to life imprisonment because of new evidence secured and presented by a psychiatrist, Dr. Anita M. Muhl. It was revealed that no body was ever found and that the supposed deceased wife had been seen after the supposed crime walking on the streets of Los Angeles. Even more important was Dr. Muhl's observation that the negro's daughter was a hysterical and hypersuggestible individual whose testimony was self-contradictory and altogether unreliable.

Three Ohio murder cases were listed by the committee, of which Dr. Karl A. Menninger of Topeka, Kansas, is chairman, as illustrating the need of more psychiatry in the courts.

George Remus, accused wife murderer, although pronounced sane by a commission of psychiatrists, was declared insane by a jury. He is now attempting to secure release from an Ohio hospital, where he is detained. Charles Lewis of Columbus, Ohio, a confessed murderer, although declared sane by a commission of experts, was later judged not guilty because of insanity. The Velma West case, the committee report states, concerns a murder in which an inferred homosexual relationship was implied to have moved the court to special consideration of the mental factors in the crime and the accused was allowed to plead guilty to a second degree murder charge.

Only one out of ten courts have a psychiatrist attached to their staffs, but four out of ten courts make it a habit to refer suspected cases to private physicians for mental examination before trial. One-third of the public penal institutions of the country employ psychiatrists, a similar proportion employ psychologists, and half of them refer suspected prisoners to experts.

## *Jury Can't Decide Sanity*

"What can a lay jury know of mental disorders that they should be made the final arbiters as to whether or not a man is insane?" Dr. William J. Mayo in these words of his address of welcome to the Association attacked the present system of allowing twelve good men and true to decide technical medical questions that often are difficult for the doctors who are specialists.

Not even an M. D. without special psychiatric training should be allowed to give testimony in court upon men-

tal disease. As Dr. Mayo said: "It is very difficult, especially for the average physician and layman, to tell what is going on in a man's mind."

"Unfortunately, in jurisprudence a plea of insanity is too often made to serve the cupidity and chicanery of man," Dr. Mayo said. Court testimony of physicians without special experience or training in diagnosing mental disease, he characterized as "usually a covert attempt by a so-called expert for the purpose of influencing the jury rather than to aid justice."

Even Einstein with complex theories of the universe has a simple problem compared with the one that confronts the psychiatrist, Dr. Adolph Meyer of Johns Hopkins University, Baltimore, declared in his presidential address.

"Einstein with all his concern in the relativity in astronomy has to deal with very simple facts as compared to the complex erratic and multiconfingent performance of the human microcosmos, the health, happiness and efficiency of which concerns psychiatrists," he said.

"We deal with the most unruly and wilful part or aspect of man, the very organ or function of self-assertion, self-concern and self-protection. Mankind would like to be free of the scourges and their consequences without having to surrender the joys and habits that spread and engender them. It would like remedies for drug and alcohol addiction without having to give up its cravings and gratifications. The same holds for the prevention of paresis and syphilis and the control and training of emotion and fancy that clash with reality, and for the craving for self-realization at any price in contrast to a sensible acceptance of a consensus."

Dr. Meyer also reviewed the rise of psychiatry during the past forty years.

## *Study Human Behavior*

The gigantic problem of human behavior, the root of all the crime, unhappiness and maladjustment of the world, was considered by the scientists.

A few years ago, psychiatrists, or "alienists" as those of the older school were called, were concerned only with those unfortunate individuals whose markedly diseased states and maladjustments to society made it necessary for them to be (*Turn to next page*)

## Psychiatric Meeting—Continued

confined away from contact with the more sane elements of the community. At an even earlier date the mentally diseased were burned as witches or looked upon as possessed of superhuman powers. Even today the unfortunate who gets in the toils of the law is likely to be judged, sentenced and perhaps liberated in accordance with fixed and inelastic statutes rather than upon the advice of the understanding and skilful psychiatrist who has made the study of human nature his life work.

Encouraging testimony of the growing acceptance of the psychiatric attitude toward crime is contained in the recommendations of the National Crime Commission, announced in New York. The psychiatrists applauded the attitude of the lawyers and other leaders in crime control who recommended that every person charged with a crime be studied by impartial experts cooperating with the courts. Psychiatrists consider court duels between members of their profession as deplorable and ineffective. When a lay jury delivers summary punishment to a criminal or liberates a dangerous character, neither the criminal or society is done justice. In

past years the American Psychiatric Association has urged the nation-wide adoption of laws such as are now in force in Massachusetts and Colorado. In those states the psychiatrist studies and reports on the accused before the trial, the jury passes on the facts of the crime, not the criminal, and the court renders its verdict of preventive rather than vindictive justice. Reform of the criminal code along these lines is urged by the National Crime Commission.

But the new psychiatry reaches far beyond the asylum, jail or courtroom. The experience and technique of the mental expert can be applied with success to the irascible employe, the retarded school child, the persistent petty thief, the compulsive drinker and the multitude of other unhappy individuals who do not find themselves in step with society. Eventually it will not be necessary for the community to wait until crimes of certain sorts are committed before detecting the potential criminal. Experience and tests will allow the person with criminal tendencies to be spotted in early life at a time when his destructive ten-

dencies can be corrected or curbed.

### *Retarded Child in Large Family*

The retarded or mentally defective child who has such a hard time in school has three times as many brothers and sisters as the brilliant, gifted child. Three times out of four, the defective child has a foreign-born mother.

For the first time in the history of this country definite information on the origin and cause of the mentally defective has been gathered as the result of thorough examination of over 10,000 Massachusetts retarded school children by Dr. Neil A. Dayton of that state's health department.

The feeble-minded do not tend to be the first child of the family. This finding will allow the eldest of the family to heave a sigh of relief.

The feeble-minded do not tend to be the last child of the family. The baby of the family will be glad to know this.

But another current idea, that mental deficiency travels the same road as largeness of family, was substantiated by Dr. Dayton's studies. He found the average size of families which contained the dunces of the Massachusetts public school to be three times the size of families in which gifted children appeared.

Argument for restriction of immigration is contained in Dr. Dayton's observation that whereas less than half of the mothers in the towns surveyed were foreign born, three-quarters of the mentally defective children were born of mothers not native to the United States.

In Massachusetts the child who can not keep up with its class is not shoved over in the corner with a conical cap on its head. In fact, such treatment of retarded children has become exceedingly bad practice in practically all enlightened schools. In Massachusetts when a child is so retarded that it loses three grades it is compulsory by law that it be given a rigorous psychiatric examination. In the last thirteen years over 30,000 children have been examined in this way and now fifteen traveling school clinics under Dr. Dayton's direction are testing 5,000 children a year. From the records thus obtained, Dr. Dayton now has the first opportunity in medical history to study the cause and peculiarity of the conditions that give rise to the mentally defective who are so often a burden to themselves and society.

*Science News-Letter, June 10, 1928*



## WHAT PRICE KNOWLEDGE?

In ages of the past those who sought it—found it

But it was often expensive and limited to a few

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## THE WISTAR INSTITUTE OF ANATOMY AND BIOLOGY

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# CLASSICS OF SCIENCE:

## Role of Chlorophyl in Plants

Botany

In addition to the several experiments suggested here by Bous singault, the student will find it interesting to seal up a small green seedling with a little earth and air in an electric light bulb and watch it grow, proving for himself the self-sufficiency of the plant.

*RURAL ECONOMY, in its relations with Chemistry, Physics and Meteorology; or, An Application of the Principles of Chemistry and Physiology to the Details of Practical Farming. By J. B. Bous singault, Member of the Institute of France, etc., etc. Translated with an introduction and Notes, by George Law, Agriculturist. London, 1845.*

### Germination

If some seeds, sufficiently moistened, are placed under a bell glass containing atmospheric air confined over quicksilver, all the signs of germination will soon be perceived. In the course of a few days, provided the temperature has been sufficiently high, germination will have made a certain progress. Supposing that the temperature of the bell glass has not varied and that the atmospheric pressure remains the same, we generally find that the air, in which germination has been proceeding, has not changed its original volume; but it has been modified in its composition; a notable quantity of carbonic acid has been formed and a portion of oxygen has disappeared. The volume of carbonic acid produced represents for the most part the volume of oxygen which has disappeared. Now we know that carbon being burnt in a certain volume of oxygen gas, produces sensibly an equal volume of carbonic acid gas. It was the knowledge of this fact that induced M. de Saussure to say, that in germination carbonic acid is produced by the combustion of a portion of the carbon which enters into the composition of the seed.

In the first period of its germination, therefore, wheat, like trefoil seed, experiences a loss which may in great part be referred to elimination of the carbonic oxide. The chemical composition of these two kinds of seed at more advanced periods of their germination, no longer presents relations so simple. We easily discover that carbon continues to be eliminated; but the loss no longer corresponds with that which the oxygen of the seed ought to suffer, in order that the total loss should be represented by a definite compound of carbon. The phenomenon, in fact, becomes extremely com-



J. B. BOUSSINGAULT

plex; and we can even perceive that it must be so, when we reflect that in proportion as the green parts are evolved, a new chemical action is set up entirely different from that which takes place in the earliest periods of the germination; the green matter of vegetables having, as we shall find, the singular faculty of decomposing carbonic acid gas, and assimilating its carbon under the agency of light.

The action of the green matter begins to be manifested long before the first phases of germination have entirely ceased; so that during a certain time two opposite forces are at work simultaneously. One of these, as we have seen, tends to discharge carbon from the seed; the other tends to accumulate this element within it. So long as the first of these forces predominates, the seed loses carbon; but with the appearance of the green matter the young plant recovers a portion of this principle; finally, when by the progress of the vegetation, the second force surpasses the first in energy, the plant grows, increases, and advances to maturity.

The presence of light is indispensable to the manifestation of the chemical force by which the green parts of plants appropriate the gaseous elements of the atmosphere.

Germination, on the contrary, may take place in absolute darkness; and it would be curious to inquire into the issues of vegetation begun and ended under such circumstances, in which the organs produced by the seed would have no power to fix any of the principles of the atmosphere to repair the loss of carbon which the seed suffers. It is evident that this loss of carbon must have a limit, which is probably that of germination.

### Evolution and Growth of Plants

As germination advances, we see those organs acquiring shape and size which had appeared at first in the rudimentary state. The roots extend in length, and increase in number, and their extremities become covered with capillary fibres. The stem as it rises puts forth branches in all directions which become covered with leaves. The cotyledons which had nourished the young plant during the first days of its existence, wither and fall. Under the influence of the solar light, the vegetation progresses apace, and the organic matter, which finally constitutes the plant when it has attained maturity, weighs vastly more than the same matter which existed previously in the seed. To quote a single instance from the family of annual plants, a seed of field beet of the weight of .06175 of a grain, may by the end of the autumn give birth to a root which with its leaves shall weigh 162099 grs., or upwards of 28 lbs.

This immense and rapid assimilation can have no other source than the soil, the air and water. Without, at this time, pausing to consider the useful influence which the soil, and the substances it contains, exert upon the entire development of vegetables, we shall here assume it as a general principle that water and the air of the atmosphere alone, are capable of furnishing them with all the elements which enter into their composition, to wit—carbon, hydrogen, oxygen, and azote. In other words, a seed may germinate, vegetate, give birth to a plant which shall attain to complete maturity by the mere concurrence of water and the gases, or vapours which are diffused through the atmosphere. This fact is demonstrated by the following experiment:

In a sufficient (Turn to next page)

## Chlorophyl in Plants—Continued

quantity of properly moistened roughly pounded brick-dust (which had been heated to redness in order to destroy every trace of organic matter), a few peas were sown on the 9th of May, and the pot was transferred to a green-house in order to protect the plants from the dust and impurities which always fly about in the open air.

On the 16th of July, the peas, which looked extremely well and healthy, were in flower. Each seed had sent forth one stem, and each stem, abundantly covered with leaves, bore a flower.

On the 15th of August the pods were ripe; no more water was given, and by the end of the month plants were dry. The length of the stalks varied from about three feet three inches to five feet; but they were extremely slender, and the leaves not more than one third the ordinary size. The pods were 1.3 inch, by from 0.3 to 0.4 of an inch broad. They generally contained two peas each; one contained a single pea only, but this was almost twice the size of any of the others.

In the course of three months, therefore, these peas came to perfect maturity—ripe seeds were gathered. The analysis of the crop, which I shall give by and by, in connexion with another question which we shall have to discuss, showed that the harvest obtained under the conditions indicated, contained a considerably larger proportion of each of the elements found than was originally contained in the seed from which it sprung.

Carbon being the predominating principle in plants, it is our first duty to inquire into the origin of so much of this element as is assimilated in the course of vegetation.

Carbon is met with in a very small quantity in the atmosphere in the state of carbonic acid, and as this is one of the most soluble of the gases which enter into the constitution of the air, water always contains a considerable quantity of it in solution. Carbonic acid may therefore be in relation with plants by the medium of the air amidst which they live, and of the water which is no less indispensable to their existence. We have now to ascertain in what way this gas evolves and sets free its carbon in favour of living vegetables. . . .

In giving the grand features in

the history of this brilliant discovery of the eighteenth century, it may be said that Bonnet was the first who observed the phenomenon of the gaseous evolution effected by the leaves of vegetables; that Priestley announced that the gas disengaged was oxygen; that Ingenhousz demonstrated the necessity of the solar light to the production of the phenomenon; finally, that it was Sennebier, to whom was reserved the honour of showing that the oxygen gas obtained under these circumstances is the product of the decomposition of carbonic acid. . . .

### *Green Leaves Take Up Oxygen*

The necessity of oxygen gas in the decomposing action which plants exposed to the light exert so energetically upon carbonic acid, leads us to study particularly the phenomena which oxygen exhibits in connexion with growing plants. When a number of freshly gathered and healthy leaves are placed during the night under a bell glass of atmospheric air, they condense a portion of the oxygen; the volume of the air diminishes, and there is a quantity of free carbonic acid formed, generally less than the volume of oxygen which has disappeared. If the leaves which have absorbed this oxygen during their stay in the dark, be now exposed to the sun's light, they restore it nearly in equal quantity, so that all corrections made, the atmosphere of the bell glass returns to its original composition and volume. . . .

Saussure applied the names of inspiration and expiration of plants to these alternate effects, led by the analogy,—somewhat remote, it must be confessed, which the phenomenon presents with the respiration of animals.

The inspiration of leaves has certain limits; in prolonging their stay in the dark, the absorption becomes less and less: it ceases entirely when the leaves have condensed about their own volume of oxygen gas. And let it not be supposed that the nocturnal inspiration of leaves is the consequence of a merely mechanical action, comparable, for example, to that exerted by porous substances generally upon gases. The proof that it is not so is supplied by the fact that the same effects do not follow when leaves are immersed in carbonic acid, hydrogen or azote. In

such circumstances there is no appreciable diminution of the atmosphere that surrounds the plant. The primary cause of the inspiration of oxygen by the leaves of living plants is, therefore, obviously of a chemical nature.

With the facts which have just been announced before us, it seems very probable that during the nocturnal inspiration, the carbonic acid which appears is formed at the cost of carbon contained in the leaves, and that this acid is retained either wholly or in part, in proportion as the parenchyma of the leaf is more or less plentifully provided with water. A plant that remains permanently in a dark place, exposed to the open air, loses carbon incessantly; the oxygen of the atmosphere then exerts an action that only terminates with the life of the plant: a result which is apparently in opposition to what takes place in an atmosphere of limited extent. But it is so, because in the free air the green parts of vegetables can never become entirely saturated with carbonic acid, in as much as there is a ceaseless interchange going on between this gas, and the mass of the surrounding atmosphere; there is then, incessant penetration of the gases, as it is called. There is a kind of slow combustion of the carbon of a plant which is abstracted from the reparative influence of the light.

The oxygen of the air also acts, but much less energetically, upon the organs of plants that do not possess a green colour.

**Jean Baptiste Joseph Dieudonne Bous-singault** was born in Paris, February 2, 1802, and died in the same city May 11, 1887. But between those dates he had had a varied career, having gone to South America as a mining engineer for an English firm at the age of twenty and become attached to the staff of the famous General Bolivar. Upon his return to France he became interested in agricultural experiments and in 1839 was appointed professor of agricultural and analytical chemistry at the Conservatoire des Arts et Métiers in Paris. He took an active part in politics also, and was elected to the National Assembly in 1848. A number of discoveries in plant physiology stand to his credit. He proved that plants cannot make direct use of the nitrogen of the air, and, in the extract quoted above, showed the importance of the green parts of the plant in the oxygen-carbon dioxide reactions which are dependent on the energy obtained from sunlight.

# Lead Joins Radium in Cancer War

Medicine

Following are reported some of the important papers presented at the Minneapolis meeting of the American Medical Association during the past week.

In the base metal, lead, there may rest hope of longer life for cancer sufferers. X-rays and radium have brought relief and sometimes apparent cure to cancer patients and now lead therapy joins, experimentally, hands with radiation in the treatment of the dread disease.

Hopeful clinical tests of lead compounds upon over fifty patients were reported to the American Medical Association by Dr. H. J. Ullmann, of the Santa Barbara, Calif., Cottage Hospital. Since lead is a poisonous metal, great care must be used to select the compound of lead that will poison the body least and still produce an effect upon the unruly cancerous growth. The two least poisonous compounds and the only ones found by Dr. Ullmann to be suitable for intravenous cancer therapy are colloidal lead phosphate and tetra ethyl lead, the latter of which is the compound added to gasoline to stop motor knocks. The injection of small doses of the lead compound is made about four days before the radiation of the cancer and the lead seems to enhance the effect of the irradiation. In some cases the improvements from this combination treatment were striking, while in others it was not so effective.

Using colloidal lead phosphate in conjunction with irradiation, Drs. Albert Soiland, William E. Costolow, and Orville N. Meland of Los Angeles have had experiences that cause them to conclude that "lead, as used by us, is not the solution of the cancer problem." Temporary good effects are obtained, but "viewed over a longer period of time, the method is not encouraging."

## Public Health is Doctors' Care

Care of the public health is the particular province and special responsibility of the physician, said Dr. William Sidney Thayer of Baltimore, new president of the Association, in his inaugural address.

"In the first place, we should use every means in our power to maintain the character of our public health officials," said Dr. Thayer. "Conditions have changed for the better, but we are still treated too often to the humiliating spectacle of a mayor who appoints his family physician or some friend who has tired of practice to the position of commissioner of health."

Speaking to the 6,000 physicians representing the organized medical profession of the country, Dr. Thayer reminded them of the object of their association as stated in its constitution: ". . . to promote the science and art of medicine and the betterment of public health." It is this altruistic attitude that marks the difference between medicine and any other profession or trade, which has financial gain as its primary object. The true physician will not forget this difference, and while he must earn a living, "if his main interest be not in his profession . . . if financial gain be his sole object—he will accomplish little . . . and his name will be soon forgotten."

## Rotogravure Skin Disease

Disease lurks within the pages of the rotogravure sections of the Sunday newspaper. Those rare individuals who are susceptible to this new skin eruption described by Dr. Edward A. Oliver, of Chicago, must forego the pleasure of reading the brown picture sheets on doctor's orders.

A patient came to Dr. Oliver suffering from a dermatitis that was not cured by ordinary remedies. Realizing that it was probably due to some irritating substance, he was told not to use hair lotions, dyed clothes or to come into contact with other known skin irritants. The eruptions continued, but Dr. Oliver noticed that they were worse on Monday or Tuesday, indicating that the infection occurred on Sunday. The only difference in the patient's life on Sunday was the fact that he read the Sunday papers, and since the Sunday papers differed from the daily editions only by the inclusion of the comic and the rotogravure sections, these portions of the newspaper were suspected. The comics were exonerated, but the roto pictures were found guilty. When the patient shunned the familiar brown ink sections, he recovered and remained well.

Fourteen other cases were discovered and cured subsequently. Dr. Oliver traced the cause of the irritation to a dye used in the brown rotogravure ink, known as a diazo color, para red. This type of skin disease, that inflames the face, eyelids and sometimes the neck, is not found among the printers who handle the ink in printing. The disease is not believed to be very widespread and

seems to occur only in those who have an idiosyncrasy to the special sort of ink used in rotogravure printing. Ordinary ink has been found to be harmless.

## Annual Health Overhaul Urged

Inspection of the president and other high executives of industrial companies for wear and tear, incipient disease and healthful living was urged by Dr. Halstead G. Murray of Framingham, Mass., on the grounds that the key men of industry should have the same care that machinery, buildings and the laboring staff are now given in most progressive factories.

Health examinations of executives of one company showed that while such high-salaried healthy men do not suffer from much organic disease, nevertheless they have functional derangements caused by mental strain, worry, improper living and the neglect of simple rules of hygiene.

Errors in diet, excessive smoking, lack of exercise in winter, insufficient rest and sleep and chronic constipation were bad habits of some of the executives.

Men who were found to be on the "ragged edge" or in a rundown condition should be sent out on special vacations at once, Dr. Murray said. He also advocated an extra afternoon off each week for golf or other exercise. Vaccination against smallpox and inoculation against typhoid fever is prescribed for those who travel.

## Serum for Infantile Paralysis

The successful treatment of infantile paralysis by means of convalescent serum was reported by Drs. W. Loyd Aycock and Eliot H. Luther of the Harvard Medical School and the Vermont Department of Health.

When the sufferer from poliomyelitis was given injections of the serum immediately after being taken sick and before paralysis set in, the serious paralysis after-effects were prevented in many cases. Only 19 out of a hundred of the treated cases developed total paralysis, while 65.6 per cent. of the untreated non-fatal cases had this unhappy ending. Among the treated cases there was a strikingly lower percentage of the severer grades of paralysis. The number of deaths was also greatly reduced by the convalescent serum.

As infantile paralysis is one of the nearly hopeless (Turn to next page)

# What Chromosomes Do

Genetics

EDGAR ALTENBERG in *How We Inherit* (Holt):

Belief in the inheritance of acquired characters rests on an old conception of heredity in accordance with which the reproductive cells were the products of particles that came from the various parts of the body and that were transmitted through the blood stream. It was supposed that there were particles of a particular kind each from the muscles, nerves, etc. The reproductive cells were conceived of as a sort of little house of representatives. If for example the muscles of a person had been well developed by exercise the muscle particles would on this view be well represented in the reproductive cells and the offspring would be born with better muscular development than if the parent had not developed his muscles. In brief, the material from which the next generation developed, the germ plasm, was regarded as a product of the body (the soma).

According to the more modern view of heredity, the chromosomes and the genes contained within them are the material basis of inheritance and constitute the germ plasm. The chromosomes are contained within all cells of the body including the reproductive organs. They originate in just one way: by the growth and division of pre-existing chromosomes, a process which takes place when a cell divides and forms new cells. All the chromosomes of the body are descended in this way from those of the fertilized egg, the cell with which the

individual begins his development. The chromosomes of the fertilized egg, in turn, are derived from the reproductive cells that produced it, the egg of the mother, and the sperm cell of the father.

The fact that the chromosomes are the material basis of heredity makes an inheritance of acquired characters practically impossible. The hereditary particles (the genes) are not built up in each generation by the body and sent to the reproductive cells, as the older concept had it, but they are continuous with each other from one generation to the next through the processes of heredity and reproduction. By heredity, they are transmitted to us from our parents; by growth and reproduction they increase in numbers and populate all the cells of our body as we develop. The most peculiar thing about a gene is that it can reproduce. It can make two genes, each exactly like itself, through the process of growth and division. It does not as a rule change from one generation to the next.

"But," you may object, "surely the genes are not little gods, totally unmindful of their surroundings and free from all outside influences." Your objection is well taken, but it by no means follows that the character of the genes is constantly changing in direct response to bodily changes. A gene is dependent upon the body for just one thing: for its nourishment and other conditions necessary for its growth. If these conditions are not right the gene simply

dies as a rule; it rarely changes its nature. When it does, we have a mutation.

Unless there were something which maintained its identity from one generation to the next, there could be no human race nor any other distinctive form of life. We resemble our parents because we have the same kind of genes as they. We come to have them through inheritance.

There is another matter that must be considered in this connection, concerning what it is that we inherit. We do not really inherit from our parents their blue eyes, their skin color, or any other body characteristics. None of these things are contained in the fertilized egg. What we really inherit are genes. *We do not inherit traits; they develop.* Under a given set of outside conditions, the traits which develop are determined by the genes. Change the environment and you change possibly the course of development and so produce an acquired trait as when you go to the tropics and get a tanned skin. But you do not necessarily change the nature of the genes themselves. With a return to normal conditions development is again of the usual type because the genes have maintained their identity during the interval. In brief, traits are an offshoot, so to speak, of the germ plasm in each generation. They do not make the germ plasm. Acquired traits in particular are not inherited, because traits in general are not.

Science News-Letter, June 16, 1928

## Medical Meeting—Continued

children's diseases that has been increasingly prevalent during the last decade, the use of this serum may save many lives and much misery.

### Liver Fad May Harm Well

The fad of liver eating which has sent the price of this poor man's beefsteak up to eighty cents a pound may do harm to healthy individuals and deprive those pernicious anemia sufferers of this life-saving meat which they really need, the association was warned in a program devoted to the latest reports upon the conquest of this hitherto hopeless disease. Dr. William S. Middleton, of Madison, Wis., reported that other types of

anemia do not respond to the specific element in liver, although the Minot-Murphy diet, which includes liver, has been generally successful in treating secondary anemia.

Additional proof of the efficacy of liver in the treatment of pernicious anemia was presented in a paper by Dr. James H. Means and Dr. Wyman Richardson, of Boston. In reviewing the treatment of this disease, Dr. Means made a suggestion as to its nature. It may be the result of a diet deficiency rather than a poison or infection. The fact that many people live on insufficient diets without serious trouble, and the discovery of a successful cure of pernicious

anemia by means of predigested foods indicate that the primary cause may be a gastric defect.

### 3,000,000 Children Deaf

Three million school children are deaf and in need of systematic treatment, Dr. E. P. Fowler and Dr. H. Fletcher, of New York, declared. Tests of 1,171 children, covering a period of two years, revealed that 4.9 per cent. were seriously deafened.

The tests were made with an audiometer and five receiver holders, making it possible to test forty children at one time. All children who were found to be below standard were retested at least once.

Science News-Letter, June 16, 1928

# Plant Cells Emit Ultra-Violet Rays

*Botany-Physics*

The latest sensation in German scientific circles is the discovery that the apex of certain rapidly growing vegetable and animal tissues emit some sort of invisible radiation which has the power to stimulate the growth of living matter with which it is not in contact. When this was first announced in 1924 by Prof. Alexander Gurwitsch of Moscow it was received with considerable skepticism, but now it has been confirmed by German investigators who are eagerly prospecting the new field of research in various directions.

Prof. Gurwitsch found that if the tip of one of the rootlets of an onion or turnip was fixed so as to point at right angles to the side of another root, though as much as a quarter of an inch away, the cells in the side nearest the tip would multiply more rapidly than elsewhere, and so bend the root away. That this influence was not due to the emission of some

gaseous emanation from the root tip was proved by the interposition of a thin sheet between the two roots. Glass and gelatin sheets stopped the transmission of the growth stimulation power, but quartz did not. This is characteristic of ultra-violet rays and Gurwitsch concludes that the radiation from the root tips has a wavelength of 180-200 millimicrons, which would place it among the ultra-violet rays of high frequency.

The German botanist, N. Wagner, has repeated these experiments with bean and onion roots and measured the effect by counting under a microscope the number of new cells produced in the roots acted upon. The increase is as high as 70 per cent. in some cases. Old cells that have ceased growing show the greatest relative increase.

The German bacteriologist, M. A. Baron, has found that the radiation from onion roots will likewise accel-

erate the growth of anthrax bacillus and other bacteria. The growing tip of toadstools gives off these same growth-generating (mitogenetic) rays.

The Siemens Electrical Company has taken up the question and Doctors Hauser and Vahle, working in these laboratories, report that certain growing animal tissue, such as cancer, emit such rays.

These results, if confirmed, will radically revolutionize present theories of life and growth. It has hitherto been assumed that the impulse to cell subdivision was somehow due to the direct contact of certain chemical substances transmitted through the tissues, but it now seems that an energy agency is active in vital processes, an immaterial radiation of the nature of light but of too high a frequency to be detected by our eyes.

*Science News-Letter, June 16, 1928*

## Modern Diogenes—Continued

Then there are the organizations that attempt, among other work, to teach ideals of honest behavior. Does urging children to play the game fairly, to emulate George Washington's example of honesty about chopping down cherry trees, really get results when the child faces some small crisis in his career? The Character Education Inquiry wanted to know, because millions of dollars are spent on teaching ideals to children without much attempt to check up on results.

"We found in several schools a system of interesting school children in the achievement of virtues by practising them," the psychologists state. "Each child was expected to keep a daily record of certain kinds of good deeds, among which was truth telling. He was rewarded for a good record by being advanced in the organization from rank to rank.

"In one school, where about half the boys had joined, the members of the organization cheated more on every test except the athletic contest. Furthermore, the higher the rank achieved, the greater the deception.

"Girls under the influence of this system cheated less than girls who did not have it. Yet the longer they were in the organization, and the higher they rose in rank, the more they cheated. We can only conclude

that it is not the system which is responsible for greater honesty among these girls. It is not clear whether the organization happens to advance those children most proficient in subterfuge, or whether it makes them into more facile liars."

Children attending Protestant Sunday schools and Hebrew religious schools were slightly less deceptive as a group than those who did not attend, but the difference was pronounced negligible. Apparently, the investigators conclude, these religious schools do not meet this particular problem at the present time. A typical organization for young people was also studied, with the discovery that members differed very little from non-members in honesty. "But it must at once be added, "the investigators say, "that in other ways these various religious and character building organizations may be having a vast influence for good."

In one experiment the psychologists tried to find out whether teaching of ideals does carry over into a child's behavior when the child really links up the lesson with his own conduct. The experimenter stepped up to the blackboard and wrote, "Honesty is the best policy" just before giving a test. He left the room while the children scored their own papers, so that cheating was easy. Later, in

another experiment, he wrote on the board, "God loves an honest man."

In this series of tests, the children who had religious training grew progressively more honest as the idea of honesty and then the idea of God was introduced. Children who did not attend religious schools got progressively less honest in the same circumstances.

Introducing these ideas straight into a situation where honesty was a live problem plainly changed the children's behavior to a noticeable degree. From this experiment, it is suggested that "the differences in behavior are large enough to warrant the feeling that in certain forms of religious training there are potential values that are far from being realized in the ordinary life of the children concerned."

To teach young children to meet their problems fair and square, it is proposed that adults should take the time to manage situations so that the child will not feel the need to deceive, and will not think of deception as desirable. Then, as the child builds up behavior habits in which he plays an honest part, he may gradually gain an intelligent grasp on the social significance of honor, and a really usable ideal of honesty.

The twenty-odd tests of honest conduct used in (*Turn to next page*)

# The Fall of Man

*Evolution*

KIRTLEY F. MATHER in *Old Mother Earth* (Harvard Univ. Press):

Partaking of the fruit of the tree of knowledge of good and evil is a very real experience, both for each individual and for the human race as a whole. The patriarchs of Palestine had observed that one of the characteristics which distinguish man from other animals is his sense of moral law. And they were correct. Far back before the dawn of recorded human history certain ancestors of ours first said it would be right to do this thing, wrong to do that. A consciousness of moral law had emerged from the evolutionary processes which Old Mother Earth was directing. Man had partaken of the fruit of the tree of knowledge of good and evil. And more than likely it was a woman who first considered the moral consequences of human deeds, and then taught a man what

she herself had learned. It was a real achievement, a major upward step in the progress of life, something of which we may well be proud and something which should clearly be distinguished from the so-called "fall of man." Not until human beings had attained a knowledge of good and evil could they be held morally responsible for their acts. Sin in the theological sense consists of wilfully doing what one knows to be wrong. Man could not "fall" until he had climbed; he should be blamed, not for climbing, but for the subsequent falling.

The parable continues; man discovers that he is naked. Anthropologists tell us that primitive folk did not at first attire themselves in clothing through any sense of modesty. Doubtless they are right. My own observations among uncivilized Indians east of the Bolivian Andes led me

several years ago to the conclusion that clothing there was designed as a protection against mosquitoes, midges, and gnats. Actually, modesty played no part in the determining of costume. Nevertheless, the adorning or covering of the body is a direct by-product of the consciousness of self, another characteristic which sets man apart from the animals, which display no indication of being self-conscious. Doubtless the emergence of self-consciousness from the brute consciousness of the lower animals must have been more or less contemporaneous with the dawning recognition of moral law.

Similarly the statement concerning the origin of man, set as it is in the midst of obvious figures of speech, should be considered as allegory rather than as science. Man is a creature of mixed motives and conflicting natures. At times he permits his animal instincts to rule his conduct; he exists upon a dead level with the beasts; he proves that he is of the earth, earthy. At other times he lifts his face toward the stars; he yearns for an understanding of himself and of his environment; he resolves to live a more useful life tomorrow than he has been living today; he is of the heavenly, divine. How better could this important truth be crystallized in the Hebrew annals than by describing man as made of the dust of the ground and the breath of life! To ascribe to that statement the idea that man was literally manufactured from mud is a libel upon Genesis. It is equivalent to maligning modern science with the charge that evolution means that man is a descendant from a monkey.

*Science News-Letter, June 16, 1928*

The giraffe's chief weapons are his heels.

The grizzly bear is the world's largest carnivorous animal.

The U. S. Coast Guard was instrumental in saving 3,317 lives last year.

Brightly colored clothes tend to make an individual look larger.

The Library of Congress at Washington has one million maps in its files.

For the first time in eight years the British birthrate shows an increase.

## Modern Diogenes—Continued

the four years of the investigation are a first definite step towards finding out the tendencies in children and predicting success in living. These tests are not varied enough to show what a person would do in all kinds of situations where there is a chance to lie, cheat, or steal. But anyone who takes twenty of the tests is practically measured, the investigators declare. If a pupil cheats ten times in twenty tests, the chances are that he will cheat once in every two opportunities in all similar situations—until something happens to change his conduct.

Where the child or the grown person resorts to trickery, this is always a symptom that the psychologist reads as a sign of bad adjustment to life. Back of the dishonesty are the underlying causes that need looking into and remedying. The great mass of facts growing out of the Character Education Inquiry has shown that poverty, ignorance, stupidity, broken homes, all pull down the nation's standards of honesty. When still more is understood about causes of deceit, the task of controlling and reorganizing the behavior of children on scientific principles can be begun. It is a little like the task of the chemist who analyzes rubber or camphor in his laboratory and then proceeds to put together all the proper ingredients to make the

same thing in a test tube. Two thousand years after Diogenes, science has only begun in earnest to discover the ingredients that go into the making of an honest man.

*Science News-Letter, June 16, 1928*

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## FIRST GLANCES AT NEW BOOKS

**TWENTY-SEVENTH YEARBOOK OF THE NATIONAL SOCIETY FOR THE STUDY OF EDUCATION, 1928**—*Public School Pub. Co.* (\$1.75). Part I of this useful annual is devoted this year to "Nature and Nurture: Their Influence Upon Intelligence." An investigation by Dr. Frank N. Freeman and five associates at the University of Chicago reported in considerable detail deals a body blow to the popular belief that intelligence is fixed by inheritance and determined at birth. Several hundred children placed in foster homes were tested "before and after" for this study. Children placed in better homes improved considerably more than children in poorer homes. Children adopted very young gained more in their intelligence ratings than those adopted later. Other equally interesting tests confirm the general thesis that homes as well as hereditary factors are important factors in the development of intelligence.

*Pedagogy*

*Science News-Letter, June 16, 1928*

**WIRELESS COMMUNICATION IN THE BRITISH EMPIRE**—G. Stanley Shoup—*U. S. Bureau of Foreign and Domestic Commerce* (\$1.10). In this new trade information bulletin is contained a complete summary of what the British Government is doing to unite the dominions and colonies with the home government by radio. In considerable detail is related the efforts to form an imperial radio system, beginning in 1910, and which is now reaching culmination with beam transmission.

*Radio*

*Science News-Letter, June 16, 1928*

**AN OUTLINE OF PHYSICS**—Albert Edward Caswell—*Macmillan*. A well-written college physics text of the conventional pattern, and recent enough to include the quantum theory, relativity, Miller's recent repetitions of the Michelson-Morley experiment, and modern views of atomic structure.

*Physics*

*Science News-Letter, June 16, 1928*

**EAT, DRINK AND BE HEALTHY**—Clarence W. Lieb—*John Day* (\$1.50). Considering the health fads and "eat more" advertising campaigns that sweep over the country, this rational statement of dietetic needs based on the existing medical knowledge of nutrition should fill a very definite place.

*Hygiene*

*Science News-Letter, June 16, 1928*

**PSYCHOLOGY OF INFANCY AND EARLY CHILDHOOD**—Ada Hart Arlitt—*McGraw-Hill* (\$2). The discovery that the pre-school child is important psychologically is beginning to yield its crop of books for all manner of persons concerned with children. This volume would be somewhat over the head of the average mother who has yet to add conditioned reflexes and stimuli to her vocabulary. Its style and content are rather addressed to students, teachers, doctors perhaps, and others who may specialize in the science of the pre-school child. Current knowledge of the subject is very completely gathered into the book, and there is even enough physiological psychology to explain briefly such matters as sensations and glandular processes of young human beings.

*Psychology*

*Science News-Letter, June 16, 1928*

**MORTON PRINCE AND ABNORMAL PSYCHOLOGY**—W. S. Taylor—*Appleton* (\$1.75). The subject of this study stands out as an American psychologist who pioneered in the field of abnormal psychology and blazed important trails. But his writings are scattered and voluminous, and apparently Dr. Prince himself has never cared to reduce his theories and findings to a compact little book such as this. Dr. Taylor has accomplished a difficult task, and not the least valuable chapter of the book is the conclusion, in which the author emerges from his detached place as an interpreter and sums up the defects and the significance of Dr. Prince's work.

*Psychology*

*Science News-Letter, June 16, 1928*

**MUSIC—A SCIENCE AND AN ART**—John Redfield—*Knopf* (\$2.50). Those who cultivate the art of music rarely pay any attention to music as a science, and *vice versa*. Both parties should read this book. The author, a Columbia lecturer on the physics of music, not only gives a clear survey of the fundamentals of the subject, but he advocates radical innovations in musical notation and instrumentation. He condemns the tempered piano and organ, and urges just intonation. He proposes new harmonic systems and suggests new orchestral instruments, even the improvement of the sacred violin.

*Psychology*

*Science News-Letter, June 16, 1928*

## NATURE RAMBLINGS

By FRANK THONE

*Natural History*



### Moon's Darling

Walking in the thick woods, you may find a fleck of May moonlight clinging to the rough bark of a tree, though the day be at high noon. If you will examine it closely, without venturing to touch it or even breathe on it, you will discover that it is a Luna moth, queen of all the elfin life that flies at night.

Her wings are pearly white, turning back into a pair of closely forked swallow-tails. Each forewing bears a darker eyespot, connected by a line to the brown front border, and the feathery antennae are brown likewise. Luna is very probably fast asleep, for she flies only at night, and by day only the luckiest of searchers is likely to discover her.

One might go on and picture this queen of the midnight revels sipping a delirious nectar out of the cups of flowers, but from an honest natural-history standpoint it wouldn't be so. Luna is a lovely dancer, but an austere one. She neither eats nor drinks; unlike most other moths she has no mouthparts fitted for feeding.

It may well be asked, where then does she get the strength for her ecstasy of flight, and the material for the numerous progeny of eggs she leaves on an oakleaf before she dies? Luna lives on stored-up energy. During the previous season, when she was a fat green caterpillar, she accumulated sufficient body-tissues to last her through the trying period of pupation during the winter, to grow her glorious wings, and to give her, when spring came, the strength to use them and to carry through the activities of adult mothhood, without bite or sup after the time she spun herself into her silken cocoon.

*Science News-Letter, June 16, 1928*

## A Statement of Purpose

(The aims, ideals and aspirations of an institution)

**S**CIENCE SERVICE is a unique institution, established at Washington for the purpose of disseminating scientific information to the public. It aims to act as a sort of liaison agency between scientific circles and the world at large. It interprets original research and reports the meetings of learned societies in a way to enlighten the layman. The specialist is likewise a layman in every science except his own and he, too, needs to have new things explained to him in non-technical language. Scientific progress is so rapid and revolutionary nowadays that no one can keep up with it from what he learned at school. Science Service endeavors to provide life-continuation courses in all the sciences for newspaper readers anywhere in America without tuition fees or entrance examinations.

In a democracy like ours it is particularly important that the people as a whole should so far as possible understand the aims and achievements of modern science, not only because of the value of such knowledge to themselves but because research directly or indirectly depends upon popular appreciation of its methods. In fact the success of democratic institutions, as well as the prosperity of the individual, may be said to depend upon the ability of people to distinguish between science and fakes, between the genuine expert and the pretender.

Science Service spares no pains or expense in the endeavor (1) to get the best possible quality of popular science writing and (2) to get it to the largest possible number of readers. If in doing this it can make both ends meet, so much the better. If not, it will do it anyway.

Through the generosity of E. W. Scripps, Science Service has been assured of such financial support as to insure its independence and permanence. Mr. Scripps's long and wide experience as a newspaper editor and proprietor had convinced him of the importance of scientific research as the foundation of the prosperity of the nation and as guide to sound thinking and living and he realized the need for an independent agency that would bring the results of research to the attention of the entire people so these could be applied to the solution of their personal, social or political problems.

Science Service is chartered as a non-profit-making institution and all receipts from articles, books, lectures and films are devoted to opening up new avenues for the diffusion of knowledge and developing promising methods of popular education. Although Science Service has a philanthropic purpose, it is conducted on business principles, with the aim of making each branch of its activities ultimately self-supporting so far as possible. All acceptable contributions are paid for and all published articles are charged for.

Science Service is under the control of a Board of Trustees composed of ten scientists and five journalists. The leading national organizations of all the sciences, the National Academy of Sciences, the National Research Council, and the American Association for the Advancement of Science, appoint three trustees each.

Science Service occupies offices in the magnificent new building of the National Academy of Sciences and the National Research Council on Potomac Park opposite the Lincoln Memorial.

This strategic situation enables the Service to keep constantly in touch with the progress of the sciences because new inventions and discoveries are promptly put on exhibition in the building, and the Council brings together investigators in the various sciences and leaders in engineering and industry from all parts of the country.

Science Service is not a governmental institution, but it is in close contact with the numerous governmental bureaus of research. It is not under the control of any clique, class or commercial interest. It is not the organ of any single scientific association. It serves all the sciences. It engages in no propaganda, unless it be called propaganda to urge the value of research and the usefulness of science.

Science Service began its work on January 1, 1921, and has now a sizable office staff with a large corps of contributors in the chief research institutions of this country and Europe.